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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Wei Du

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EXAMINER

CUTLIFF, YATE KAI RENE

ART UNIT

PAPER NUMBER

1621

MAIL DATE

DELIVERY MODE

08/19/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/597,123	Applicant(s) DU ET AL.	
	Examiner YATE' K. CUTLIFF	Art Unit 1621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 July 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>5/22/2007 & 6/5/2007</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1 - 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over National Research Inst of Brewing (JP 2002-233393) (Brewing), in view of Siegfried et

Art Unit: 1621

al. (WO 03004591) and Soumanou et al. (Enzyme and Microbial Technology, July 2003) and further in view of Wu et al. (US 6,398,707).

5. The rejected claims cover, inter alia, a process biodiesel from renewable oil under lipase catalysis in an organic medium reaction system, wherein a short chain alcohol ROH is used as an acyl acceptor, a relatively hydrophilic organic solvent having no negative effect on the reactivity of the lipase is used as a reaction medium, and a renewable oil raw material is catalyzed by a lipase to synthesize biodiesel through a transesterification reaction, characterized in that: the short chain alcohol and the renewable oil raw material having an alcohol/renewable oil molar ratio of 3:1 to 6:1, together with 20-200% by volume of the organic solvent based on the volume of the renewable oil, and 2-30% by weight of the lipase based on the weight of the renewable oil are added into an enzyme reactor and mixed evenly, the mixture is then heated to 20-60°C to react for 4-24 hours to convert the renewable oil raw material into biodiesel and byproduct glycerin. The solvent is selected from tert-butanol and short chain fatty acid esters RCOOR'. The lipase is from a microorganism and can be Lipozyme TL, Lipozyme RM, Novozyme 453 or mixtures thereof. The oil can be vegetable, animal, waste, marine or lard. The alcohol is a short chain alcohol with 1-5 carbon atoms. The remaining dependent claims disclose the reaction conditions.

6. Brewing discloses a process for the production of bio-diesel fuel from vegetable or animal oils using lower alcohols catalyzed by lipase in organic solvents. (see abstract, and translated paragraphs [0040], [0042]). One of the forms of alcohols used includes t-butyl alcohol. (see paragraph [0042]). The alcohol to oil ratio is 1:1 to 4:1,

Art Unit: 1621

and the amount of lipase is 300 to 5000U. (see paragraph [0044]). The reaction temperature is 25 -40°C and carried out with stirring at about 50 to 300 rpm. (see paragraph [0045]). The organic solvents used included DMSO, n-hexane or petroleum ether, and added in amounts ranging from 5 -15%. (see paragraph [0046]).

Brewing fails to disclose; that the solvent can be a short chain fatty acid esters RCOOR'; and that the lipase used can be Lipozyme TL, Lipozyme RM, Novozyme 453.

However, Siegfried et al. discloses transesterification of fats and/or oils where at least one short chain alkyl fatty acid ester is added during the initial phase resulting in a single phase reaction mixture. (abstract and claim 2 of translation).

With regard to the lipase catalyst being Lipozyme TL or Lipozyme RM, Soumanou et al. sets out a process for lipase-catalyzed synthesis of fatty acid methyl esters (biodiesel) where the catalyst are Lipozyme TL or Lipozyme RM; and the process uses organic solvents. (abstract, page 98 column 2, paragraphs 2.1 & 2.3.1).

Further, with regards to the use of a lipase catalyst such as Novozyme 453, Wu et al. teaches the use of a treated Novozyme 453 in the reaction for making fatty acid esters, in particular biodiesel. In Wu et al. the lipase Novozyme 435 is pretreated with different solvents such as soybean oil, biodiesel (alkyl ester), iso-propanol, 2-butanol, tert-butanol and n-hexane and then used as the lipase catalyst in the transesterification reaction. (see Example 1).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to use known techniques as disclosed in Brewing, Soumanou et al. and Wu et al., where each process uses one of the known forms of

Art Unit: 1621

lipase to catalyze a transesterification reaction for the production of a biodiesel from vegetable or animal oil in the presence of alcohol and organic solvent; and where the organic solvent is used to solve the problem of inactivation of the lipase. Further, it would have been obvious to use a fatty acid ester as the organic solvent in view of the teaching of Siegfried et al., where it is taught that this type of organic solvent can form a single phase reaction mixture which produces a higher reaction rate and product yield; and the success that Wu had when using lipase pre-treated with the organic solvents. Thus, it would have been obvious to one of ordinary skill in the art to apply the techniques of adding an organic solvent to a transesterification reaction which was catalyzed by lipase as taught by Brewing, Soumanou et al. and Wu et al. and achieve reduced inactivation of the catalyst and improve the yield of the biodiesel with a reasonable expectation of success.

Variations of particular work available in one field of endeavor may be prompted by design incentives and other market forces, either in same field or different one, and if person of ordinary skill in art can implement predictable variation, 35 U.S.C. §103 likely bars its patentability; similarly, if particular technique has been used to improve one device, and person of ordinary skill would recognize that it would improve similar devices in same way, then using that technique is obvious. *KSR International co. v. Teleflex Inc.*, 550 U.S. at _____, 82 USPQ2D 1385 (U.S. 2007).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to YATE' K. CUTLIFF whose telephone number is (571)272-9067. The examiner can normally be reached on M-TH 8:30 a.m. - 5:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Daniel M. Sullivan can be reached on (571) 272 - 0779. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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